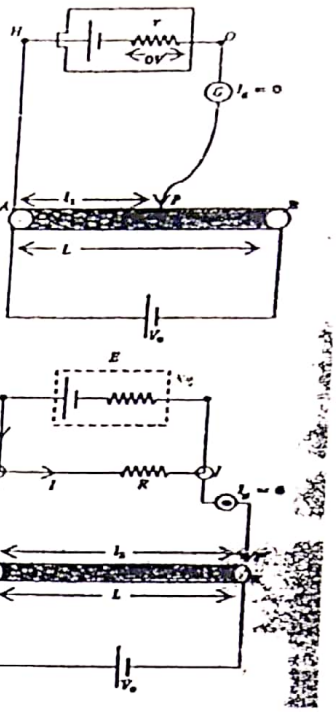
Q13. a) Use Potentiometer to find internal resistance of a cell.
b) Compare Potentiometer and Voltmeter.

Ans. a) Arrangement 1:-



1. Voltage per unit *length*, $K = \frac{V_0}{L}$
2. Voltage across *HJ* $= E - (0)\, r = E$
3. Voltage across *AP* $= \frac{V_0}{L} \cdot l_1$
4. $(Volt)_{HJ} = (Volt)_{AP}$

$$E_1 = \left(\frac{V_0}{L}\right) l_1 \quad \text{---------} (1)$$

Arrangement 2:-

1. Voltage across HJ $= R\left(\frac{E}{R+r}\right)$.
2. Voltage across AP $= \frac{V_0}{L} \cdot l_2$
3. $(Volt)_{HJ} = (Volt)_{AP}$

$$E\left(\frac{R}{R+r}\right) = \left(\frac{V_0}{L}\right) l_2 \quad \text{--------} (2)$$

Dividing (2) by (1)

$$\left(\frac{R}{R+r}\right) = \left(\frac{l_2}{l_1}\right)$$

$$r = R\left(\frac{l_1}{l_2} - 1\right)$$

b) Comparison of voltmeter and potentiometer

Voltmeter	Potentiometer
1. Measures approximate value of e.m.f.	1. Measures accurate value of e.m.f.
2. Based on deflection method.	2. Based on null deflection method.
3. Draws some current for measuring e.m.f.	3. Does not draw any current for measuring e.m.f.
4. Sensitivity is low	4. Sensitivity is high.

+2 / Unit 2 / Q13a
Potentiometer To Find Internal Resistance Of A Cell

+2 / Unit 2 / Q13b
Potentiometer Vs Voltmeter